

**Enclosure B-4**  
**Steel Finishing Segment Information**  
**Possible BAT/NSPS/Pretreatment Options**

**!     *Clean Water Act Requirements***

The Clean Water Act requires that EPA periodically review and revise, as appropriate, categorical, technology-based effluent limitations guidelines and standards for use in the NPDES permit and pretreatment programs. The Act identifies three types of pollutants that must be regulated by the effluent limitations guidelines and standards, and specifies six levels of treatment for existing and new dischargers, as follows:

*Types of Pollutants*

Conventional:	TSS, BOD <sub>5</sub> , oil & grease, pH, and fecal coliform.
Priority:	Cyanide; designated priority metal pollutants (e.g., chromium, lead, mercury, nickel, selenium, zinc); and designated priority organic pollutants (e.g., benzene, benzo- <i>a</i> -pyrene, naphthalene, 2,3,7,8-TCDD (dioxin)).
Nonconventional:	Pollutants that are not designated as conventional or priority, but which may exhibit toxic effects in aquatic ecosystems or to humans (e.g., ammonia-N, chlorine, phenols (4AAP), dissolved iron, COD, and 2,3,7,8-TCDF (furan)).

*Levels of Categorical Effluent Limitations Guidelines and Standards*

BPT - Best Practicable Control Technology Current Available  
BCT - Best Conventional Pollutant Control Technology  
BAT - Best Available Technology Economically Achievable  
NSPS - New Source Performance Standards  
PSES - Pretreatment Standards for Existing Sources  
PSNS - Pretreatment Standards for New Sources

BPT, BCT, and BAT are applicable to existing direct dischargers; PSES are applicable to existing indirect dischargers; and NSPS and PSNS are applicable to new direct and new indirect dischargers, respectively. Generally, discharges of all types of pollutants may be regulated at BPT and at NSPS; discharges of only conventional pollutants are regulated at BCT; and, discharges of toxic and nonconventional pollutants are regulated at BAT and at PSES and PSNS.

As part of its review of 40 CFR Part 420, EPA is considering whether to revise categorical effluent limitations guidelines and standards for all pollutants of concern in the iron and steel industry at all levels of treatment.

## **! Current 40 CFR Part 420 - Steel Finishing Operations**

For purposes of this review, steel finishing operations include the following:

### Carbon Steel Mills

- Acid pickling: HCl; H<sub>2</sub>SO<sub>4</sub>; other
- Cold rolling and annealing
- Surface cleaning and coating (hot dip and electroplating)

### Specialty and Alloy Mills

- Salt bath and electrolytic descaling
- Acid pickling: HNO<sub>3</sub>; HNO<sub>3</sub>/HF; H<sub>2</sub>SO<sub>4</sub>; H<sub>2</sub>SO<sub>4</sub>/HF; other
- Cold rolling and annealing
- Surface cleaning and coating

## *Pollutants Limited*

The current Part 420 contains separate, subcategory-specific effluent limitations guidelines and standards for salt bath descaling, acid pickling, cold forming, alkaline cleaning, and hot dip coating operations. Electroplating operations conducted at steel mills are regulated currently by 40 CFR Part 433 - Metal Finishing. The pollutants limited are not consistent across the steel finishing processes regulated by Parts 420 and 433. EPA is considering whether to establish new and/or expanded subcategories that would apply separately to carbon steel mills and specialty and alloy mills.

The current Part 420 limits conventional, nonconventional, and priority pollutants for steel finishing processes, as follows:

### **Salt Bath Descaling**

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Total Cyanide <sup>a</sup>	✓	✓		✓	✓
Total Chromium	✓	✓		✓	✓
Total Nickel	✓	✓		✓	✓
pH	✓		✓	✓	

<sup>a</sup> Cyanide applicable to reducing operations only

### Acid Pickling (HCl, H<sub>2</sub>SO<sub>4</sub>)

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Oil & Grease <sup>a</sup>	✓		✓	✓	
Total Lead	✓	✓		✓	✓
Total Zinc	✓	✓		✓	✓
pH	✓		✓	✓	

<sup>a</sup> Oil & grease applicable when cotreated with cold rolling

### Acid Pickling (Combination)

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Oil & Grease <sup>a</sup>	✓		✓	✓	
Total Chromium	✓	✓		✓	✓
Total Nickel	✓	✓		✓	✓
pH	✓		✓	✓	

<sup>a</sup> Oil & grease applicable when cotreated with cold rolling

### Cold Forming

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Oil & Grease	✓		✓	✓	
Total Chromium <sup>a</sup>	✓	✓		✓	✓
Total Lead	✓	✓		✓	✓
Total Nickel <sup>a</sup>	✓	✓		✓	✓
Total Zinc	✓	✓		✓	✓
Naphthalene	✓	✓		✓	✓
Tetrachloroethylene	✓	✓		✓	✓
pH	✓		✓	✓	

<sup>a</sup> Chromium and nickel applicable when cotreated with descaling or combination acid pickling wastewaters.

### Alkaline Cleaning

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Oil & Grease	✓		✓	✓	
pH	✓		✓	✓	

### Hot Coating

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓		✓	✓	
Oil & Grease	✓		✓	✓	
Hexavalent Chromium <sup>a</sup>	✓	✓		✓	✓
Total Lead	✓	✓		✓	✓
Total Zinc	✓	✓		✓	✓
pH	✓		✓	✓	

<sup>a</sup> Hexavalent chromium applicable to galvanizing wastewaters from chromate rinse

### Electroplating

	<u>BPT</u>	<u>BAT</u>	<u>BCT</u>	<u>NSPS</u>	<u>PSES/PSNS</u>
Total Suspended Solids	✓			✓	
Oil & Grease	✓			✓	
Total Cyanide	✓	✓		✓	✓
Cyanide Amenable to Cl <sub>2</sub>	✓	✓		✓	✓
Total Toxic Organics	✓	✓		✓	✓
Total Cadmium	✓	✓		✓	✓
Total Chromium	✓	✓		✓	✓
Total Copper	✓	✓		✓	✓
Total Lead	✓	✓		✓	✓
Total Nickel	✓	✓		✓	✓
Total Silver	✓	✓		✓	✓
Total Zinc	✓	✓		✓	✓
pH	✓			✓	

## *Technology Basis*

For the above-listed steel finishing operations regulated by Part 420, the EPA model BAT treatment systems for the existing regulation include the following major components:

- Waste loading reduction (e.g., acid regeneration or acid recovery for hydrochloric acid and sulfuric acid pickling, respectively);
- In-process flow reduction (e.g., cascade rinsing and recycle of fume scrubber water for acid pickling operations);
- Process-specific pretreatment for selected pollutants (e.g., reduction of hexavalent chromium to trivalent chromium for salt bath descaling; emulsion breaking and oil recovery for cold rolling operations); and
- Lime precipitation and settling for treatment of toxic metals.

The model BAT treatment systems for electroplating operations regulated by Part 433 include the same basic technologies described above for steel finishing operations regulated by Part 420.

## ***! Possible Revisions to Part 420***

### *Pollutants to be Limited*

EPA is considering whether to establish separate effluent limitations guidelines and standards for two segments within the steel finishing sector: (1) carbon steel finishing mills; and (2) specialty and alloy steel finishing mills. All candidate pollutants have not been identified at this time; however, it is likely that, as a minimum, lead and zinc will be considered for carbon steel finishing mills and chromium and nickel will be considered for specialty and alloy mills. EPA will also consider whether to establish effluent limitations guidelines and standards for other toxic metals and toxic organic pollutants as well as ammonia-N and nitrates for specialty and alloy steel finishing operations.

### *Preliminary BAT/NSPS Technology Options*

Figures 15 and 16 are schematic diagrams of possible BAT treatment technology trains for carbon steel finishing operations and specialty and alloy steel operations, respectively. (Figures 1 through 14 were presented in the materials for cokemaking, integrated steelmaking and forming, and non-integrated steelmaking and forming.) One option incorporating resource recovery and pollution prevention techniques, pretreatment of specific wastestreams, and cotreatment of compatible wastewaters in a centralized end-of-pipe wastewater treatment system is being considered for each segment. Each is described briefly below:

*BAT/NSPS Option for Carbon Steel Finishing Operations* (Figure 15). The process-specific resource recovery, pollution prevention, and pretreatment systems included in the model BAT technology train for each carbon steel finishing operation are listed below:

#### Acid Pickling

- Acid recovery for sulfuric acid and acid regeneration for hydrochloric acid;
- Indirect heating of acid baths to avoid or eliminate direct steam sparging;
- Cascade rinsing;
- Recycle of fume scrubber water; and
- Best management practices to maintain wringer rolls.

#### Cold Rolling and Annealing

- In-process treatment and reuse of rolling solutions; and
- Pretreatment of waste rolling solutions by oil emulsion breaking and oil recovery.

#### Cleaning and Surface Preparation Operations

- Cascade or countercurrent rinsing, where feasible;
- Acid recovery for sulfuric acid and acid regeneration for hydrochloric acid;
- Indirect heating of acid baths to avoid or eliminate direct steam sparging; and
- Recycle of fume scrubber water.

#### Hot Dip Coating Lines (zinc, terne, zinc/aluminum, other)

- Cascade or countercurrent rinsing, where feasible;
- Recycle of fume scrubber water; and
- Closed-loop chromate rinse systems.

#### Electroplating (Tin, Chromium, Zinc, Zinc-Nickel, other)

- In-process recovery and conditioning of plating solutions;
- Cascade or countercurrent rinsing, where feasible;
- Recycle of fume scrubber water; and
- Pretreatment of hexavalent chromium-bearing wastewaters.

The end-of pipe centralized wastewater treatment facilities include diversion tanks for off-specification wastewaters and unplanned batch dumps of high strength wastewaters from the process lines; hydraulic and waste loading equalization; two-stage lime precipitation; sedimentation; and filtration for effluent polishing. Collected sludges would be thickened in a sludge thickener, dewatered in a filter press, and landfilled. In certain circumstances, it may be advisable to treat separately wastewaters from electroplating operations to minimize the volume of wastewater sludges considered hazardous wastes; or, to recover a material (e.g., zinc hydroxide).

*BAT/NSPS Option for Specialty and Alloy Steel Finishing Operations* (Figure 16). The process-specific resource recovery, pollution prevention, and pretreatment systems included in the model BAT technology train for specialty and alloy steel finishing operations are similar to those cited above for carbon steel finishing operations listed above. Some additions are:

- Indirect cooling of salt bath descaling quench baths to minimize the volume of quench water requiring treatment;
- Acid recovery for nitric/hydrofluoric, nitric, and sulfuric acids; and
- Elimination of urea as an agent to minimize NO<sub>x</sub> emissions from nitric/hydrofluoric acid and nitric acid pickling baths.

The centralized end-of-pipe wastewater treatment systems would be essentially the same as those for carbon steel finishing mills. EPA may also consider specific treatments for nitrates in wastewaters from specialty steel finishing wastewaters. Depending upon the type of specialty or alloy steels processed and concentrations of metals in wastewater sludges, sludge drying for subsequent recovery of metal values may be feasible.

Preliminary PSES and PSNS options are the same as the preliminary BAT/NSPS options set out above.

It is important to note that while effluent limitations are established based upon the performance of specific technologies, owners or operators of steel finishing mills may use any combination of process changes, process water recycle and reuse, and end-of-pipe wastewater treatment technologies to comply with the numerical effluent limitations guidelines and standards.

#### *Best Management Practices*

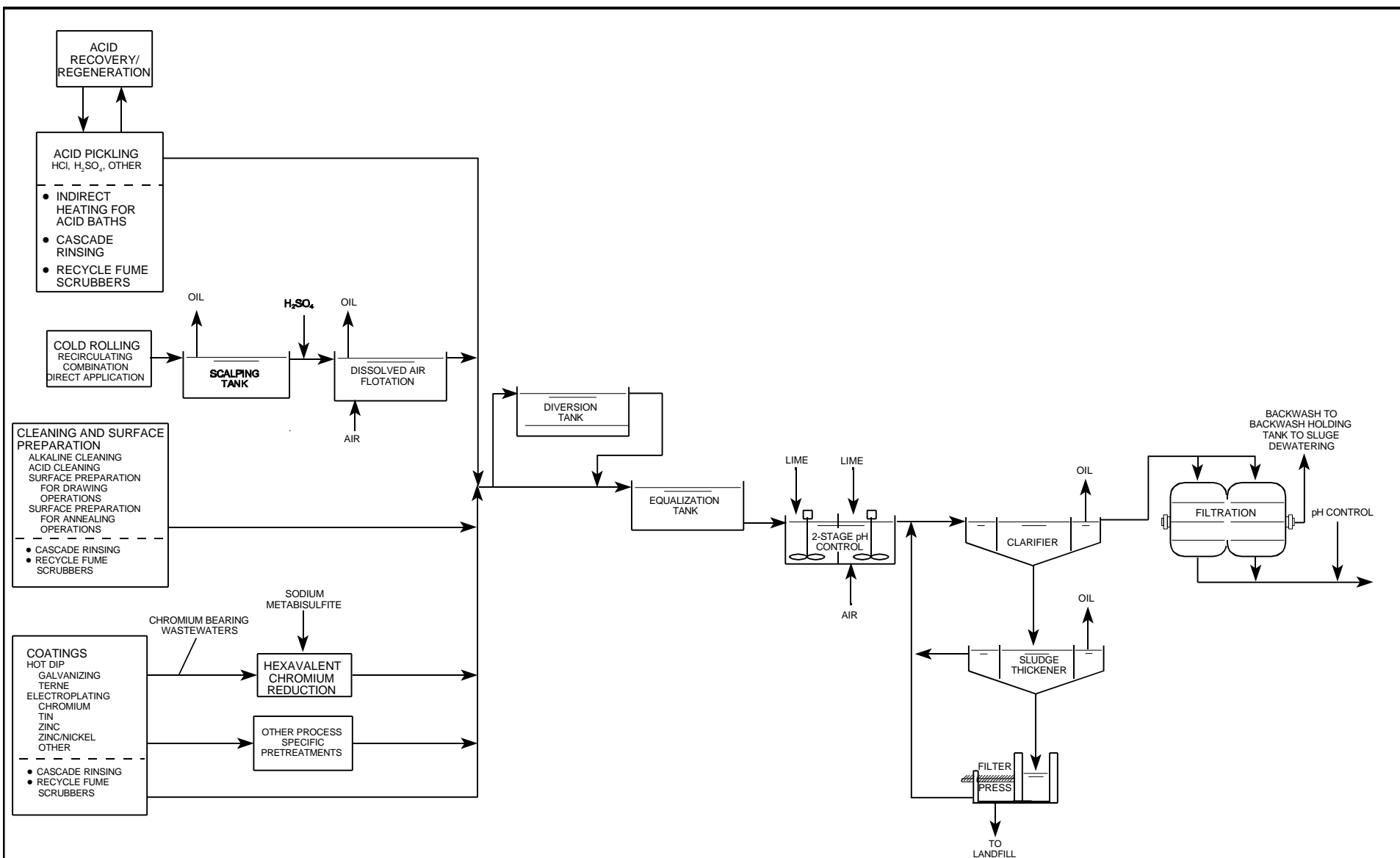
EPA is considering whether to include in a revised Part 420 additional best management practices for steel finishing operations to those included in the preliminary model BAT technology trains that have yet to be identified.

#### *Regulatory Flexibility*

EPA is also considering whether to amend the *water bubble* rule at 40 CFR §420.03 to allow for expanded pollutant trades.


Although not yet formulated, EPA may consider incentive programs as part of BAT which could, for example, provide for extended compliance schedules in exchange for advance levels of treatment.

EPA invites comments on these and alternate approaches to regulating steel finishing operations.

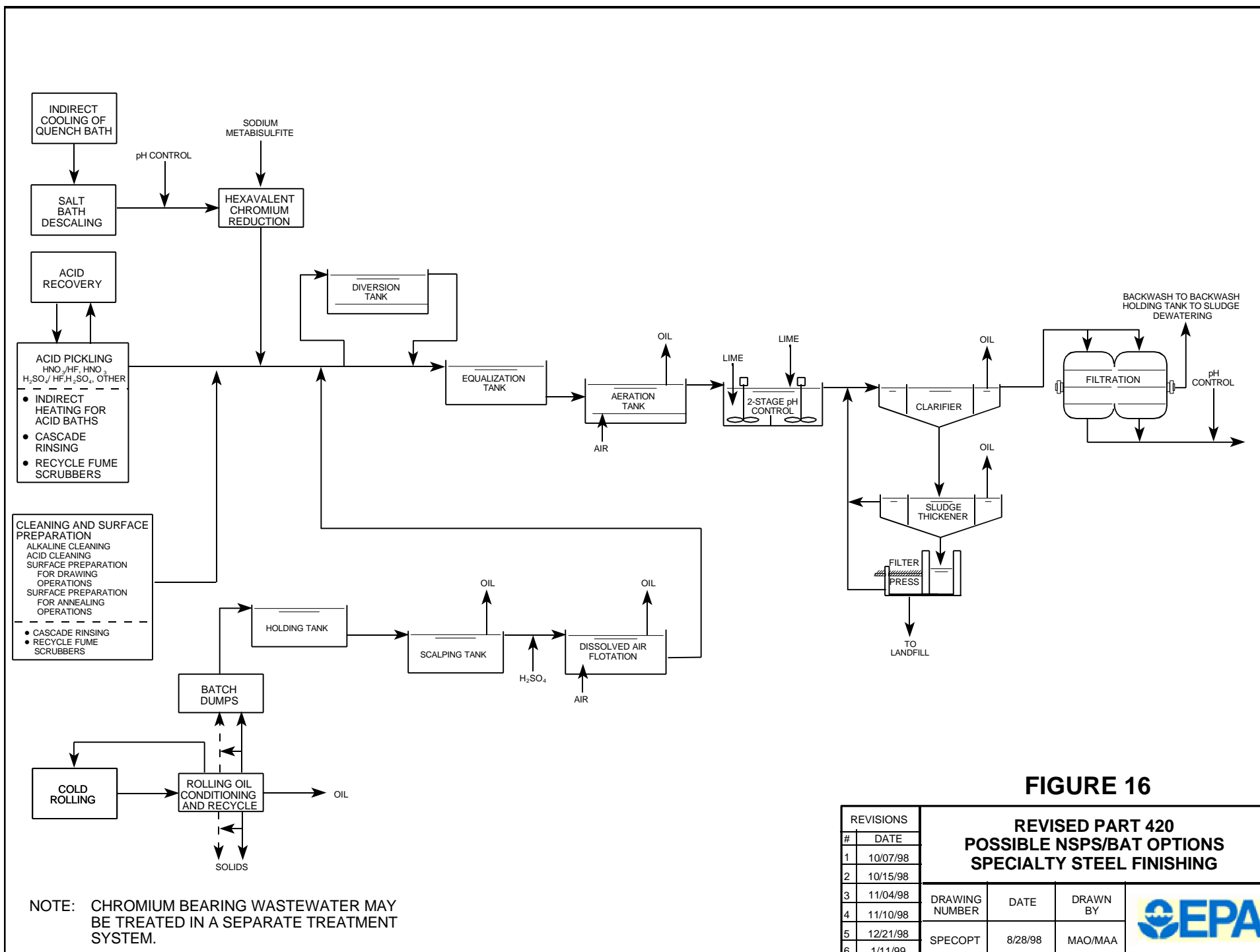


NOTE: CHROMIUM BEARING WASTEWATER MAY BE TREATED IN A SEPARATE TREATMENT SYSTEM.

FIGURE 15

REVISIONS		REVISED PART 420 POSSIBLE NSPS/BAT OPTIONS CARBON STEEL FINISHING			
#	DATE	DRAWING NUMBER	DATE	DRAWN BY	
1	10/07/98				
2	10/15/98				
3	11/04/98				
4	11/10/98				
5	12/21/98				
6	1/11/99	CARBOPT	8/28/98	MAO/MAA	





**FIGURE 16**

REVISIONS		REVISED PART 420 POSSIBLE NSPS/BAT OPTIONS SPECIALTY STEEL FINISHING			
#	DATE	DRAWING NUMBER	DATE	DRAWN BY	
1	10/07/98				
2	10/15/98				
3	11/04/98				
4	11/10/98				
5	12/21/98				
6	1/11/99	SPECOPT	8/28/98	MAO/MAA	

